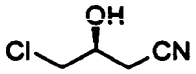
Claims

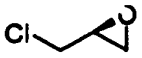
[1] 1. A process for preparing 4-chloro-3-hydroxybutyronitrile of formula:

[2] 

(4)

, comprising the step of

1) reacting epichlorohydrin of formula:

[3] 

(2)

with a cyanide of formula:

$M(CN)_n$

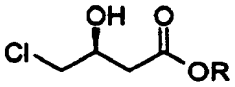
(3)

, wherein M is a cation, and n is an integer of 1 to 3,

under the condition of pH ranging from 7 to 8, to form the

4-chloro-3-hydroxybutyronitrile of formula (4).

[4] 2. A process for preparing 4-chloro-3-hydroxybutanoic acid ester of formula:

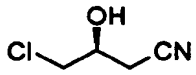
[5] 

(1)

, wherein R is C_{1-4} alkyl,

comprising the step of

2a) dissolving 4-chloro-3-hydroxybutyronitrile of formula:

[6] 

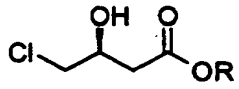
(4)

in an alcoholic solvent, and then, reacting it with hydrogen chloride, or

2b) reacting the 4-chloro-3-hydroxybutyronitrile of formula (4) in an alcoholic solvent saturated with hydrogen chloride,

to form the 4-chloro-3-hydroxybutanoic acid ester of formula (1).

[7] 3. A process for preparing 4-chloro-3-hydroxybutanoic acid ester of formula:

[8] 

(1)

, wherein R is as defined in Claim 2,

comprising the steps of:

1) reacting epichlorohydrin of formula:

[9] 

(2)

[10] with a cyanide of formula:

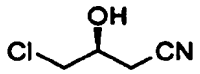
$M(CN)_n$

(3)

, wherein M and n are each as defined in Claim 1,

under the condition of pH ranging from 7 to 8, to form

4-chloro-3-hydroxybutyronitrile of formula:

[11] 

(4);and

2a) dissolving 4-chloro-3-hydroxybutyronitrile of formula (4) in an alcoholic solvent, and then, reacting it with hydrogen chloride, or

2b) reacting 4-chloro-3-hydroxybutyronitrile of formula (4) in an alcoholic solvent saturated with hydrogen chloride, to form the

4-chloro-3-hydroxybutanoic acid ester of formula (1).

[12] 4. The process of Claim 1 or 3, wherein the pH is adjusted in the range of 7.3 to 7.8.

[13] 5. The process of Claim 1 or 3, wherein the pH is adjusted by adding an inorganic acid to the cyanide solution, and then, epichlorohydrin is added thereto.

[14] 6. The process of Claim 5, wherein the inorganic acid is selected from the group consisting of hydrochloric acid, nitric acid, sulfuric acid, sulfonic acid, and phosphoric acid.

[15] 7. The process of Claim 6, wherein the inorganic acid is sulfuric acid or concentrated hydrochloric acid.

[16] 8. The process of Claim 1 or 3, wherein the cyanide is sodium cyanide or potassium cyanide.

[17] 9. The process of Claim 2 or 3, wherein the alcoholic solvent is methanol or ethanol.

[18] 10. The process of Claim 2 or 3, wherein the hydrogen chloride is anhydrous hydrogen chloride gas.

[19] 11. The process of Claim 2 or 3, wherein the weight-by-weight ratio of the alcoholic solvent to 4-chloro-3-hydroxybutyronitrile is in the range of 1.5:1 to 2.5:1.

[20] 12. The process of any one of Claims 1 to 3, wherein epichlorohydrin or 4-hydroxybytyronitrile has optical activity.